

Microslide Cassette Programs
for Low Vision Students
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Few microscope materials are available in the areas of biology and general science for legally blind students who have useful amounts of residual vision. Emphasis on use of residual vision and mainstreaming of legally blind students were cited by participants in a national needs meeting in science for visually handicapped students (held in Atlanta, April 1979) in their endorsement of a microslide project (Franks, 1980). A Micro-Slide-ViewerTM and slides were examined by participants who felt that the materials have significant utility for a large number of visually handicapped students in science.

Further, participants supported the approach of adapting the microslide materials for audio-tutorial learning (i.e., providing self-instructional tapes which allow the student to focus his full attention on use of the microscope without having to shift to and from a large type or braille page in a complicated two-step operation).

The principal objective of this project was the preparation of recorded tapes of the print lessons which accompany each strip of MicroslideTM views, specially edited for use by low vision students, many of whom are mainstreamed in regular science classes.

Materials Description

Two sets of materials were developed, each consisting of 20 lessons presented in regular print and on cassette tapes, and a Micro-Slide-ViewerTM. Individual lessons contain a strip of 8 MicroslideTM views with a brief explanation or description of each view. The slide photographs clearly present a variety of microscopic cross

sections and structures. Print letters, arrows, and brackets are distinct and unobtrusive. Individual letter size approaches 18 point. Each lesson begins with a simple introduction which defines, summarizes, or explains the object (or process or phase) presented. Diagrammatic information occasionally appears in the lessons.

The text presentation also includes specialized vocabulary (e.g., algae), which is spelled out, and the slide magnification factor (e.g., DIATOM--200x--left side). Provocative questions often are included in the lessons (e.g., How big is a virus?).

Contents of the Programs I and II MicroslideTM lessons present an overview of a variety of life functions, ranging from one-celled organisms to photosynthesis and plant life cycles; from pond life to human respiration and digestion; and from frog embryology to body defenses against infection. Each cassette is labeled in large type and braille.

The Micro-Slide ViewerTM, into which the MicroslideTM strips are inserted for viewing, looks quite similar to a simple microscope and is virtually unbreakable with normal use. Replacement or additional viewers are not separately available from the American Printing House for the Blind, but can be purchased from: National Teaching Aids, Inc., 120 Fulton Avenue, Garden City Park, New York 11040. A Macro-lensTM attachment also is available from National Teaching Aids which converts the viewer for use in examination of solid objects up to 3/4 inch high.

Materials Evaluation

Some 80 sets of MicroslidesTM were reviewed by three experts. Forty sets of representative views of plant and animal cross sections and structures found in basic science curricula were selected, partly on the basis of their visual clarity. Field evaluation sites were identified and criteria for evaluation of the materials specified.

Visual legibility testing of the MicroslidesTM was conducted with more than 75 low vision students from grades 5-12. The test items consisted of a representative sampling of tasks in identifying and locating letters, symbols, and structures appearing in slide views. Students responded or located target items in the near left, near right, far left, or far right sections of the slide view.

Performance exceeded the criterion that 70% of the legally blind students classified as print readers would score 80% or higher on the legibility test array of letters, symbols, and structures selected from the slide views. For Program I materials the overall mean score for subjects was 89.4%, with the top 70% of the sample achieving a mean score of 98.1% (Table 1). For Program II materials the overall mean score was 87.7%, and the top 70% of the sample achieved a mean score of 93.6% (Table 2).

Insert Tables 1 & 2 here

Student and Teacher Interviews

Interviews with teachers using the slides with students in public school programs were most positive, with some teachers indicating that even totally blind students were able to profit from information on the accompanying tapes. Teachers in residential and public school programs

reported that students saw more through the viewer than the teachers expected they would. One enterprising teacher used an Apollo Electronic Visual Aid to project on a screen the view that a student should see. Once the student understood the task and the letters and structures were identified on the Apollo screen, the student was able to use the Micro-Slide-ViewerTM. Another student with very low vision alternated between use of an overhead projector and the Micro-Slide-ViewerTM.

One teacher who used the materials with nine low vision students reported that the taped content "has been excellent for all students." The major problem for several students was their limited background in science. Students had some trouble with the scientific vocabulary, which impeded independent use of the materials. Spanish-speaking students experienced additional language difficulties. For these students, small group discussions and presentations proved effective.

Students who participated in the evaluation were highly motivated. They provided a number of suggestions and observations in individual and group interviews:

1. When the MicroslideTM units paralleled textbook assignments, students used them as overviews and/or summaries because of the brevity and conciseness of information presented on the tapes.
2. Students used a human torso in the classroom to identify organs of the respiratory and digestive systems as they listened to tapes related to these systems.
3. Totally blind students who had been through the Audio-Tutorial Reference Materials Cell Division program (Franks & Glass, 1980) recalled coiling of the chromosomes (Set 81).

4. Braille students requested that braille labels be placed on each unit to facilitate their independent use. A number of legally blind braille readers, who could not read the print letters, were able to see the slide views with the greatest figure-ground contrast.
5. Some low vision students used high intensity lighting with the Micro-Slide-Viewer™.
6. Several students who were not able to read or see letters and lines were able to find some structures on the slides. For confirmation, the teacher had students draw or sketch what they saw. Although some of the sketches were poor, they indicated students were able to see some of the structures well enough to identify them from the taped descriptions.
7. Other students utilized a paperweight magnifier with the viewer, along with high intensity lighting. This application further improved ability to see letters and structures.
8. Some students who were color blind were able to use the slides and sketch structures they saw.
9. The major problems that low vision students had were related to darkness, dimness, or clutter, and to size of some of the letters and numbers.
10. All students liked the brevity of the units and the spelling out of scientific terms.

11. Students thought the diagrams included in the print units were helpful. They used magnifiers to study these diagrams.
12. One student suggested that sketches--about twice the size of the Microslide™ view--be made of each slide.

Summary

The Microslide Cassette materials can be successfully utilized by most visually handicapped students enrolled in life science courses. Each set of materials contains 20 strips of 8 Microslide™ views, a Micro-Slide-Viewer™, cassette tapes to accompany each of the entry Microslide™ strips, and print copy of the recorded script. The content was carefully selected to augment commonly-used life sciences curricula. Visual legibility testing assures most low vision students will be able to use many of the views. Most blind students who are not able to use the visual materials are able to profit from the descriptive information on the cassettes. Each 2-track cassette is recorded at 1 7/8 ips, contains the same message on both sides to avoid the need to rewind, and is approximately 20 minutes long. The Microslide Cassette Programs are available from the American Printing House for the Blind.

CATALOG NO. (Program 1) 1-0832

(Program 2) 1-0833

Microslide Program I

Titles

An Introduction to the World of the Microscope	Set 101
Cells of Your Body	Set 10
Cells of Plants	Set 11
Animal Mitosis	Set 53
Photosynthesis	Set 59
Embryology--The Frog	Set 61
Animal Parasites of Man	Set 75
The Hydra	Set 76
The Root of a Flowering Plant	Set 77
The Stem of a Flowering Plant	Set 78
The Leaf of a Flowering Plant	Set 79
The Flower of a Flowering Plant	Set 80
Fern--The Life Cycle	Set 84
Aurelia--The Life Cycle	Set 86
Marchantia--The Life Cycle	Set 87
Moss--The Life Cycle	Set 88
Cells of Plants and Animals	Set 102
From Egg to Chick	Set 103
Harmful and Helpful Bacteria	Set 105
Life in a Pond	Set 110

Microslide Program II

Titles

Non-Green Plants--Heterotrophic Nutrition	Set 82
Algae	Set 201
Protozoa	Set 202
How Living Things Breathe	Set 21
Excretion	Set 52
How a One-Celled Animal Divides	Set 104
Skin	Set 57

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The Endocrine System	Set 71
Your Life and Breath	Set 112
Your Circulatory System	Set 113
Your Nervous System	Set 114
The Reflex ARC	Set 70
Your Digestive System	Set 116
Human Blood	Set 95
Animal Tissues	Set 51
Body Defenses Against Infection	Set 204
Parasitism--A Way of Life	Set 74
Smoking and Health	Set 73
Chromosomes and Genes in Action	Set 81
Life Functions (Paramecium)	Set 203

References

Franks, F. L., (Ed.). APH meeting on needs of blind students in science.

Louisville, Ky.: American Printing House for the Blind, 1980.

Franks, F. L., & Glass, R. D. Audio-tutorial reference materials in biology (cell division): Final report (Grant No. SP179-08277).

Louisville, Ky.: American Printing House for the Blind, 1980.

Table 1
Microslide Cassette Project I
Legibility Scores
(N=47)

	Text No.	Slide View	% Correct Response		Text No.	Slide View	% Correct Response
1.	105	6	83.0	16.	53	4	44.6
2.	79	3	97.8	17.	10	5	85.1
3.	103	3	95.7	18.	10	4	91.4
4.	60	3	93.6	19.	105	1	80.8
5.	53	5	95.7	20.	105	1	80.8
6.	11	8	89.3	21.	105	1	82.9
7.	86	4	91.4	22.	75	4	97.8
8.	86	8	95.7	23.	75	5	93.6
9.	88	2	55.3	24.	75	5	97.8
10.	88	3	63.8	25.	85	1	100.0
11.	10	7	95.7	26.	85	2	93.6
12.	80	4	95.7	27.	85	6	89.3
13.	76	6	97.8	28.	76	4	87.2
14.	77	3	82.9	29.	76	8	100.0
15.	77	7	85.1	30.	80	7	95.7

Table 2
Microslide Cassette Project II
Legibility Scores
(N=30)

	Text No.	Slide View	% Correct Response		Text No.	Slide View	% Correct Response
1.	95	3	66.7	11.	201	5	83.3
2.	95	8	100.0	12.	201	5	93.3
3.	202	2	53.3	13.	201	1	86.7
4.	202	7	93.3	14.	201	6	100.0
5.	202	8	83.3	15.	21	5	100.0
6.	104	7	96.7	16.	82	7	100.0
7.	205	5	50.0	17.	113	1	93.3
8.	205	3	83.3	18.	70	1	100.0
9.	205	7	96.7	19.	73	6	100.0
10.	57	5	76.7	20.	204	6	100.0